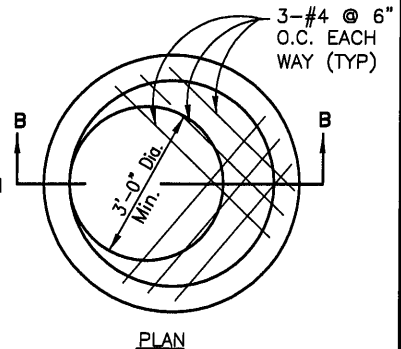
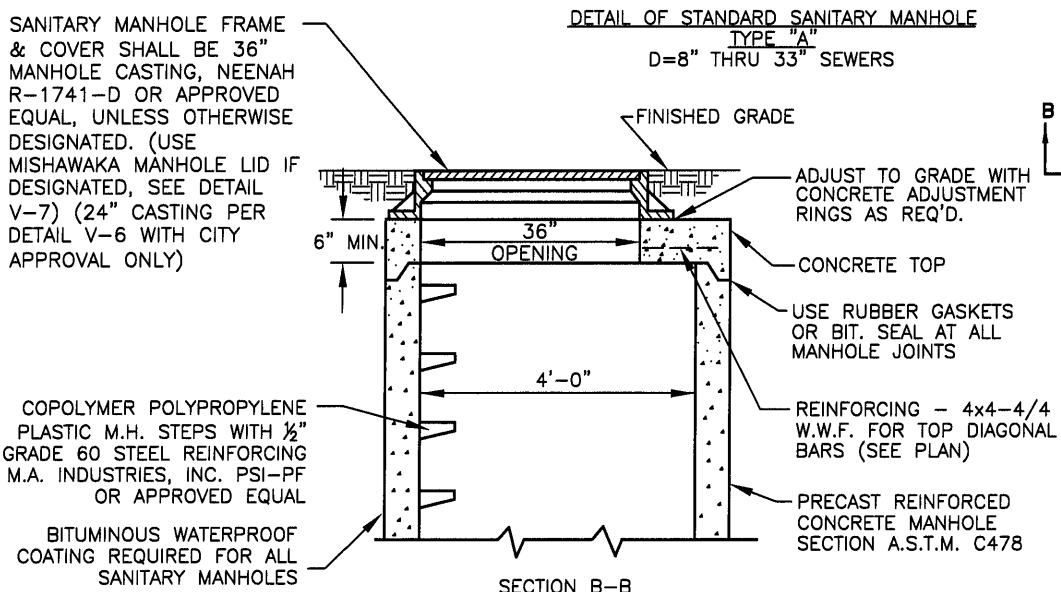


NOTE: ONLY CLAY, RCP & D.I. PIPES TO BE GROUTED IN PLACE WITH NON-SHRINKING 'EMBECCO' GROUT OR EQUAL. A COMPRESSION GASKET, PER ASTM C923, 'A-LOK' OR EQUAL, TO BE REQUIRED FOR P.V.C. AND OTHER FLEXIBLE PIPE.

SECTIONAL A-A  
N.T.S.

- NOTES:
1. WHERE DESIGNATED OR AS NEEDED COVER SHALL BE OF NON-ROCKING TYPE.
  2. WHERE DESIGNATED OR AS NEEDED PROVIDE FLOTATION COLLAR.

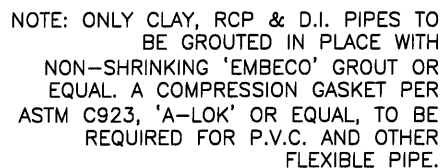


PREPARED BY: DLZ INDIANA, LLC

ANDREW C. LEMBERS  
REGISTERED  
No. PE10100882  
STATE OF INDIANA  
PROFESSIONAL ENGINEER

*ac*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY				CITY OF MISHAWAKA, INDIANA	
ITEM	REVISION	APPROVED DATE		ENGINEERING STANDARDS	
	EFFECTIVE	APRIL 2007		TYPE "A" SANITARY MANHOLE	SHT. NO. V-1
	REVISED	MARCH 2013			



"d"	"D"	"B"	"t"	"X"	"Y"
36"	60"	8"	6"	60"	AS REQUIRED
42"	72"	8"	7"	72"	"
48"	72"	8"	7"	72"	"
54"	84"	10"	8"	84"	"
60"	84"	10"	8"	84"	"
66"	96"	12"	9"	96"	"
72"	96"	12"	9"	96"	"
78"	108"	12"	10"	108"	"
84"	108"	12"	10"	108"	AS REQUIRED


NOTE: MANHOLE DIAMETER "D" REQUIREMENT  
MAY INCREASE DUE TO THE LOCATIONS OF THE  
PIPE.

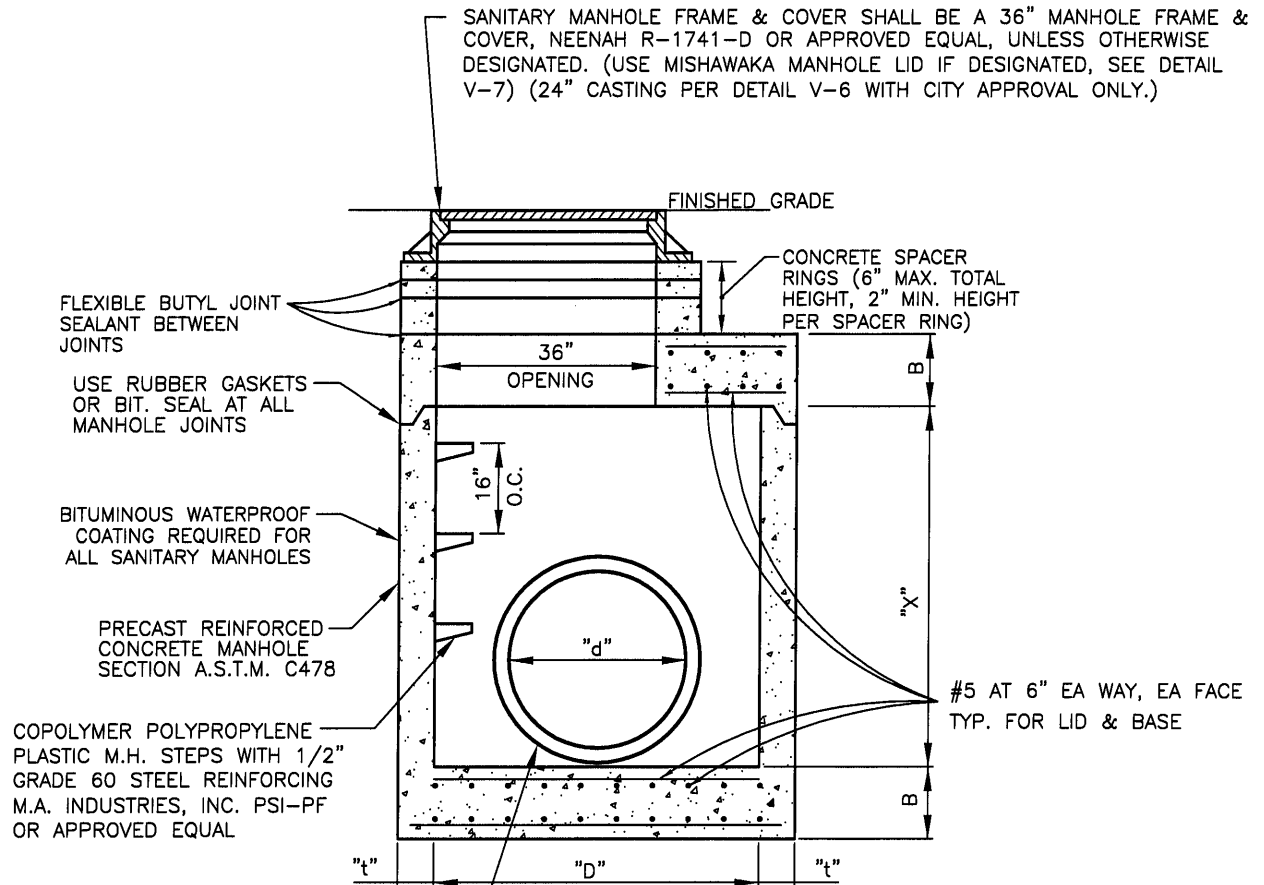
MANHOLES 72" AND SMALLER SHALL HAVE AN INTEGRALLY POURED BASE. MANHOLES 78" AND LARGER SHALL HAVE AN INTEGRALLY POURED BASE OR A WATERTIGHT GASKETED JOINT.

PREPARED BY: DLZ INDIANA, LLC



ACR  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY				CITY OF MISHAWAKA, INDIANA	
ITEM	REVISION	APPROVED DATE		ENGINEERING STANDARDS	
	EFFECTIVE	APRIL 2007			
	REVISED	MARCH 2013		TYPE "B" SANITARY MANHOLE	



NOTE: ONLY CLAY, RCP & D.I. PIPES TO BE GROUTED IN PLACE WITH NON-SHRINKING 'EMBECO' GROUT OR EQUAL. A COMPRESSION GASKET PER ASTM C923, 'A-LOK' OR EQUAL, TO BE REQUIRED FOR P.V.C. AND OTHER FLEXIBLE PIPE.

"d"	"D"	"B"	"t"	"X"
36"	60"	8"	6"	AS REQUIRED
42"	72"	8"	7"	AS REQUIRED
48"	72"	8"	7"	AS REQUIRED
54"	84"	10"	8"	AS REQUIRED
60"	84"	10"	8"	AS REQUIRED
66"	96"	12"	9"	AS REQUIRED
72"	96"	12"	9"	AS REQUIRED
78"	108"	12"	10"	AS REQUIRED
84"	108"	12"	10"	AS REQUIRED

NOTE: MANHOLE DIAMETER "D" REQUIREMENT MAY INCREASE DUE TO THE LOCATIONS OF THE PIPE.

**STANDARD SANITARY MANHOLE TYPE "B"**  
36" SEWER & LARGER  
(RESTRICTED HEADROOM)

**NOTE:**

MANHOLES 72" AND SMALLER SHALL HAVE AN INTEGRALLY POURED BASE. MANHOLES 78" AND LARGER SHALL HAVE AN INTEGRALLY POURED BASE OR A WATERTIGHT GASKETED JOINT.

PREPARED BY: DLZ INDIANA, LLC



*al*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	MARCH 2013



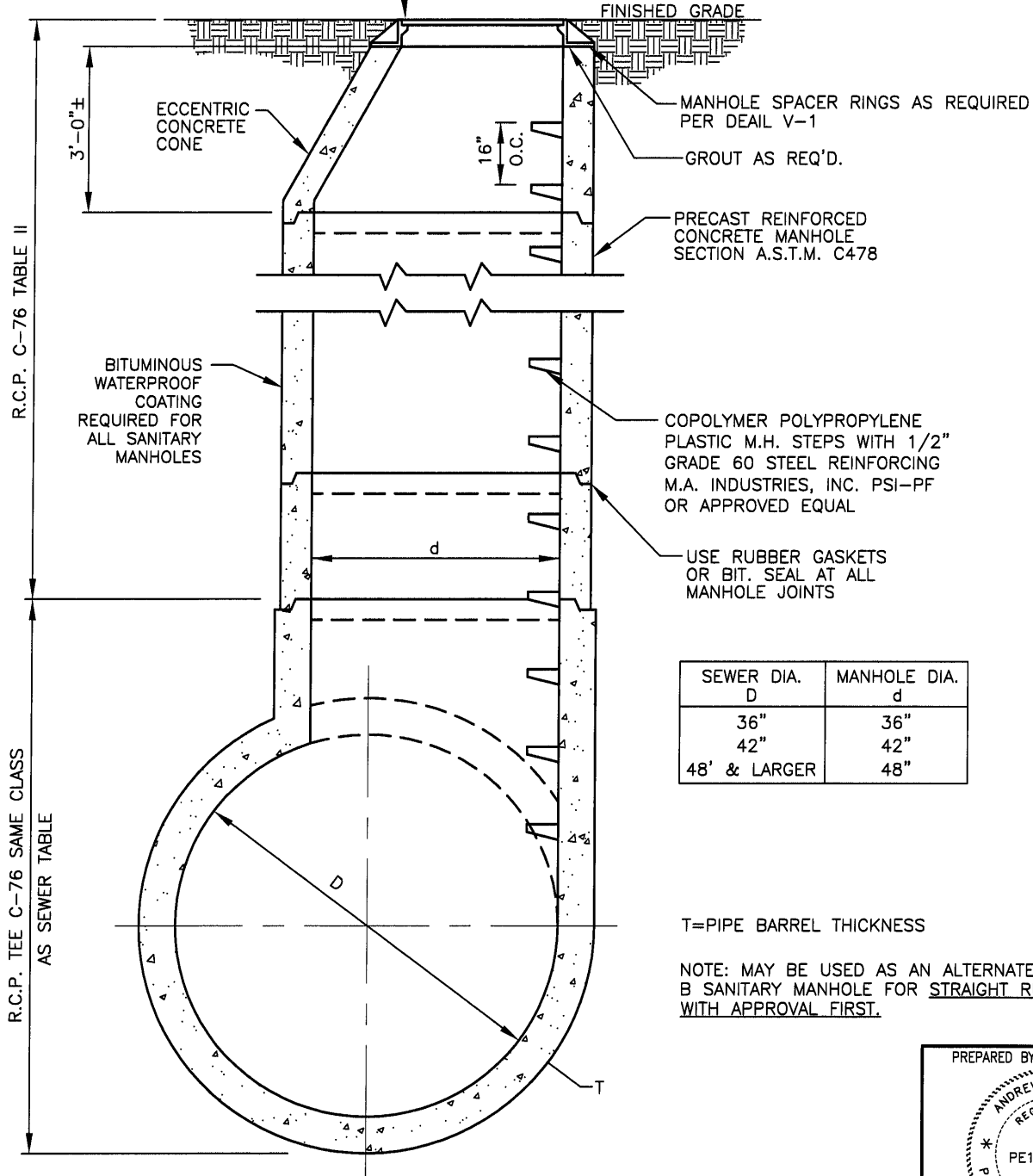
ENGINEERING STANDARDS

**TYPE "B" SANITARY MANHOLE**  
(RESTRICTED HEADROOM)

SHT. NO.

**V-3**

SANITARY MANHOLE FRAME & COVER SHALL BE A 36" MANHOLE FRAME & COVER, NEENAH R-1741-D OR APPROVED EQUAL, UNLESS OTHERWISE DESIGNATED. (USE MISHAWAKA MANHOLE LID IF DESIGNATED, SEE DETAIL V-7) (24" CASTING PER DETAIL V-6 WITH CITY APPROVAL ONLY.)



SEWER DIA. D	MANHOLE DIA. d
36"	36"
42"	42"
48" & LARGER	48"

T=PIPE BARREL THICKNESS

NOTE: MAY BE USED AS AN ALTERNATE FOR TYPE B SANITARY MANHOLE FOR STRAIGHT RUNS ONLY WITH APPROVAL FIRST.

STANDARD SANITARY MANHOLE TYPE "C"  
36" SEWERS & LARGER (STRAIGHT RUNS ONLY)

PREPARED BY: DLZ INDIANA, LLC



*DLZ*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

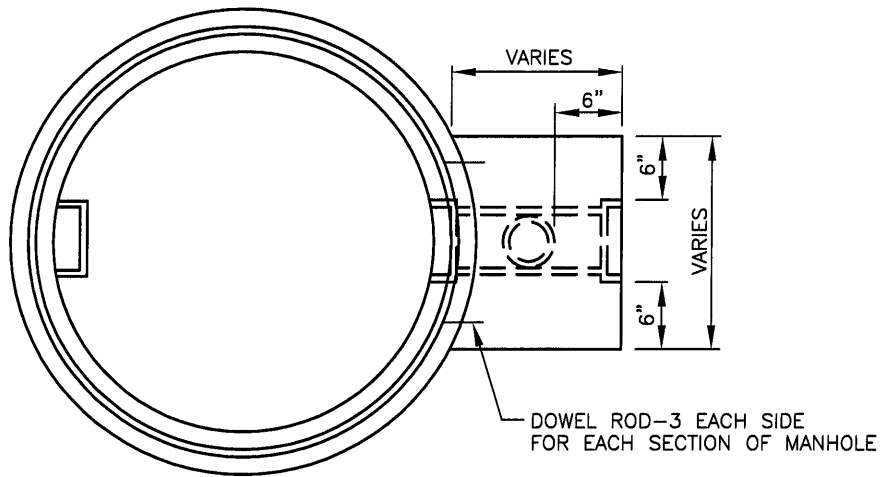
ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	MARCH 2013



ENGINEERING STANDARDS

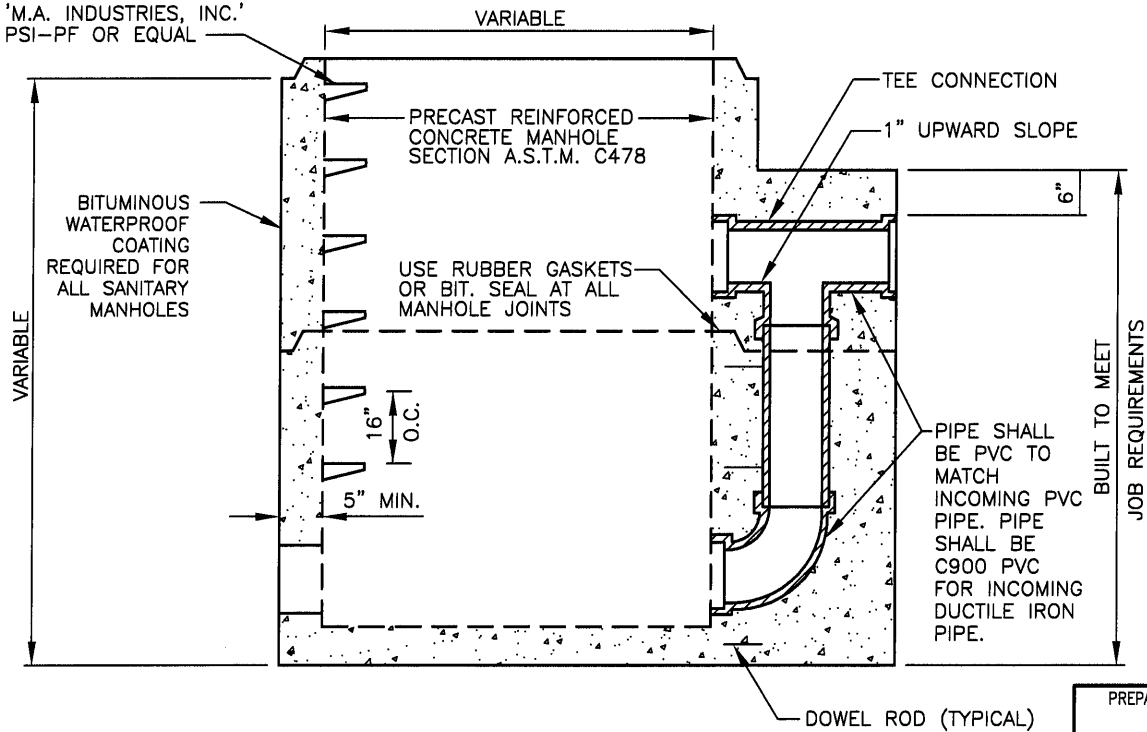
TYPE "C"  
SANITARY MANHOLE

SHT. NO.  
V-4



PLAN VIEW

COPOLYMER POLYPROPYLENE  
PLASTIC M.H. STEPS WITH  
GRADE 60 STEEL REINFORCING.  
'M.A. INDUSTRIES, INC.'  
PSI-PF OR EQUAL



CROSS SECTION

NOTES:

1. MANHOLE CONFORMS TO ASTM C-478
2. MULTIPLE SECTION DROP-PVC PIPE SEALS WITH BELL AND SPIGOT CONNECTION.
3. ONLY PRECAST DROP MANHOLES PERMITTED
4. SEE DETAILS V-1 THRU V-4 FOR ADDITIONAL MANHOLE DETAILS

PRECAST 48" DIA SANITARY DROP MANHOLE

PREPARED BY: DLZ INDIANA, LLC



*alr*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	MARCH 2013

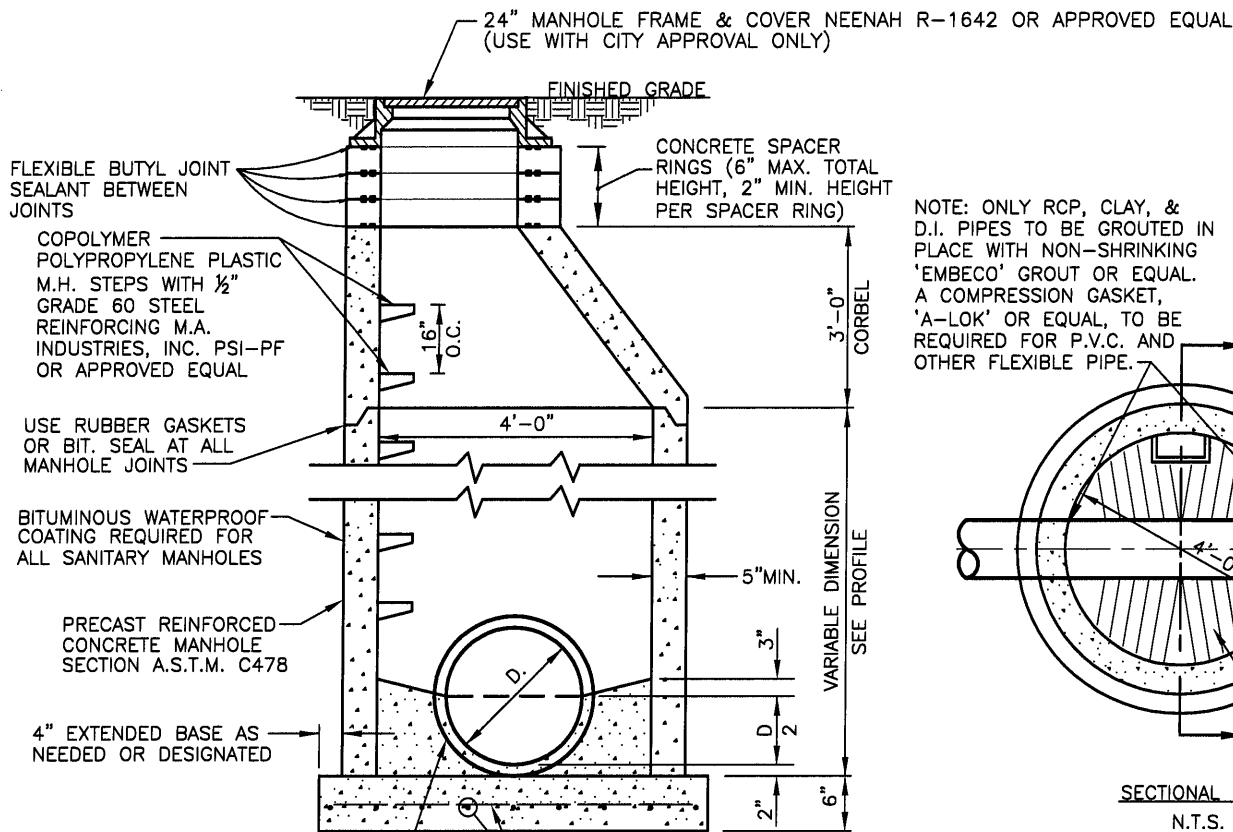


ENGINEERING STANDARDS

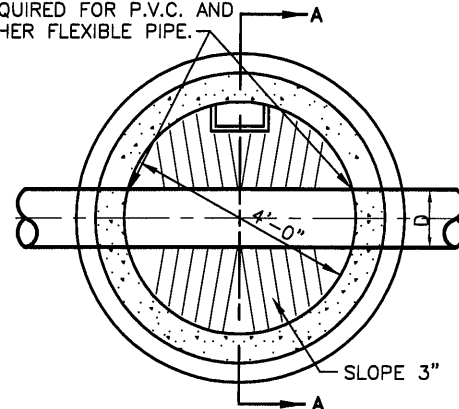
PRECAST SANITARY  
DROP MANHOLE

SHT. NO.

V-5



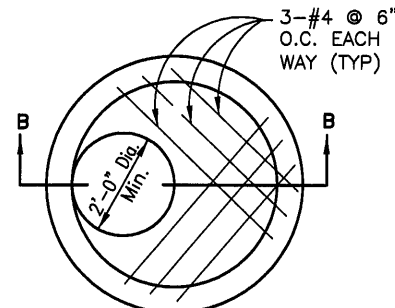
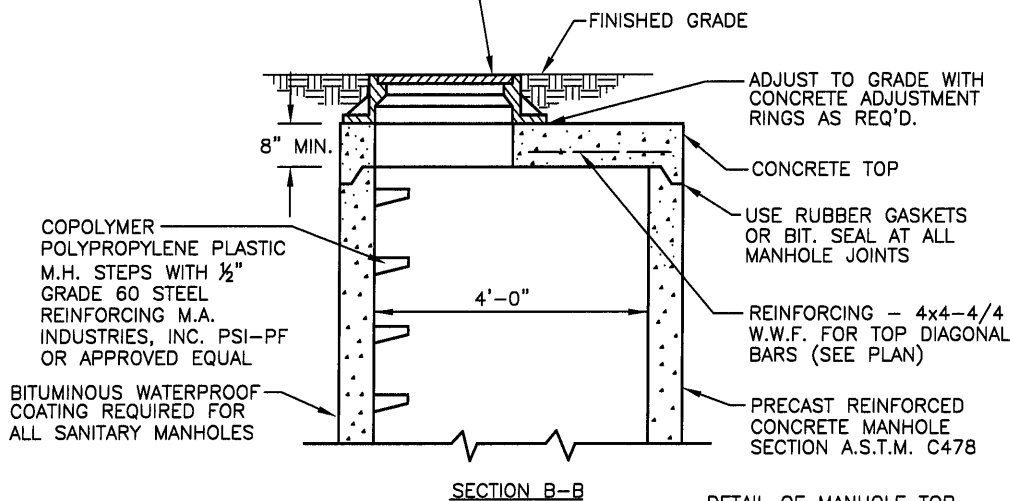
NOTE: ONLY RCP, CLAY, & D.I. PIPES TO BE GROUTED IN PLACE WITH NON-SHRINKING 'EMBECCO' GROUT OR EQUAL. A COMPRESSION GASKET, 'A-LOK' OR EQUAL, TO BE REQUIRED FOR P.V.C. AND OTHER FLEXIBLE PIPE.



- NOTES:
1. WHERE DESIGNATED OR AS NEEDED COVER SHALL BE OF NON-ROCKING TYPE.
  2. WHERE DESIGNATED OR AS NEEDED PROVIDE FLOTATION COLLAR.

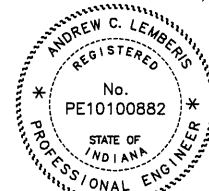
24" MANHOLE FRAME & COVER NEENAH R-1642 OR APPROVED EQUAL  
(USE WITH CITY APPROVAL ONLY)

DETAIL OF STANDARD MANHOLE TYPE "A"  
D=8" THRU 33" SEWERS



DETAIL OF MANHOLE TOP WHERE RESTRICTED HEADROOM WILL NOT PERMIT TAPERED WALLS

PREPARED BY: DLZ INDIANA, LLC



*all*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

ITEM	REVISION	APPROVED DATE
	ADOPTED: NEW (REPLACED PREVIOUS DETAIL)	MARCH 2013



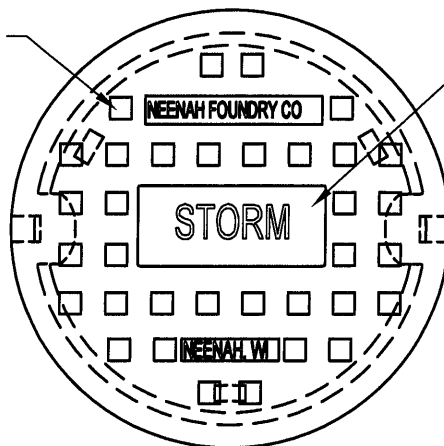
ENGINEERING STANDARDS

24" MANHOLE CASTING

SHT. NO.

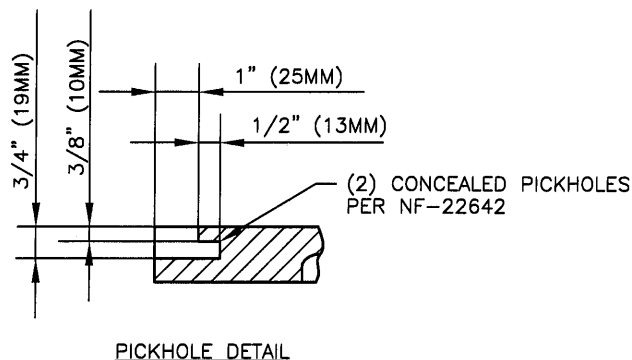
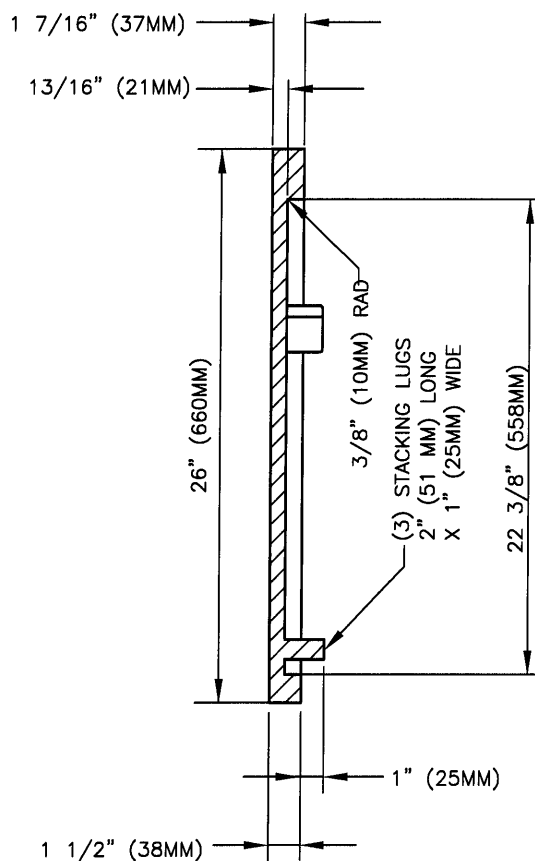
V-6

TYPE "B" RECESSED POCKET



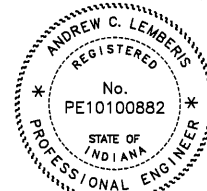
2" (51MM) RAISED LETTERS  
FLUSH W/TOP SURFACE OF LID  
ALTERNATE LETTERING  
"SANITARY"  
"FIBER OPTIC"  
"ELECTRIC"  
"WATER"

(2) CONCEALED  
PICKHOLES PER  
NF-22642



NOTE: ALL DIMENSIONS SHOWN ARE IN ENGLISH AND (METRIC)  
MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 358  
WEIGHT: 126lb.  
MANHOLE FRAME: NEENAH R-1642  
PROVIDE NEENAH TYPE E COUNTERSUNK HEX SECURITY BOLTS, IF DESIGNATED

PREPARED BY: DLZ INDIANA, LLC



*all*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

ENGINEERING STANDARDS

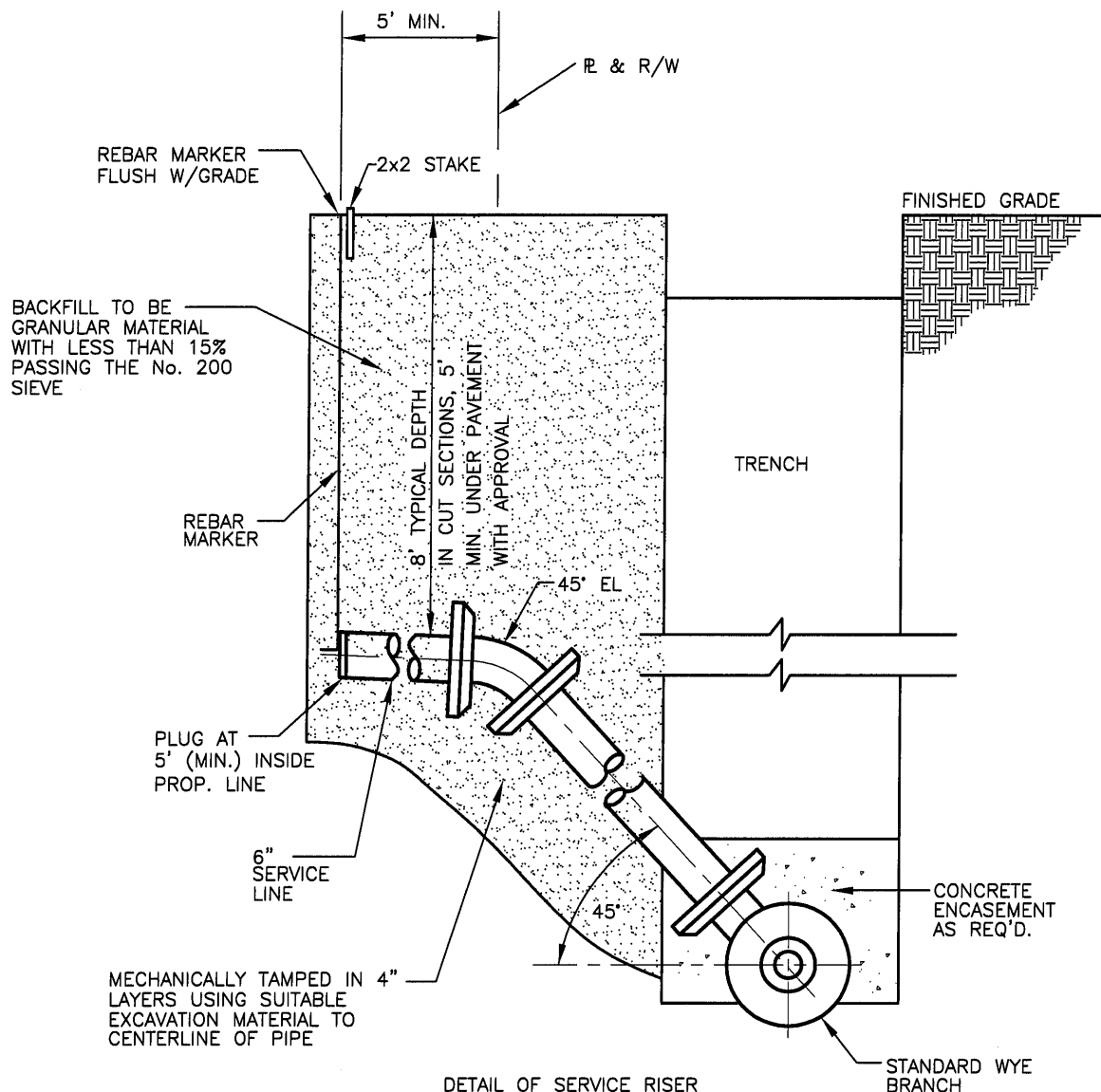
MISHAWAKA MANHOLE  
LID DETAIL

SHT. NO.

V-7

ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	MARCH 2013





DETAIL OF SERVICE RISER

BACK-FILL - IN STREETS, ALLEYS, SIDEWALKS OR DRIVING AREAS:

6" LAYERS, SOLIDLY TAMPED TO SUB-GRADE OF STREET BASE.

BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR

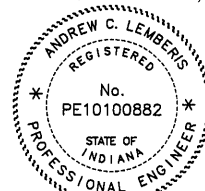
BACK-FILL - IN EASEMENT OR OPEN AREAS:

12" LAYERS SOLIDLY TAMPED.

NOTES:

1. IN CUT SECTIONS OR ADJACENT PROPOSED IS FILLED WHERE THE BUILDING AT SET BACK WILL HAVE AN EXISTING GRADE ELEVATION DIFFERENCE OF 5' OR GREATER THAN STREET PROFILE GRADE, DEPTH OF SANITARY SEWER LATERAL SHALL BE RAISED TO WITHIN 8' OF EXISTING GRADE ELEVATION.
2. ALL SANITARY SEWERS SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH THE RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES BY THE GREAT LAKES-UPPER MISSISSIPPI RIVER BOARD OF STATE AND PROVINCIAL PUBLIC HEALTH AND ENVIRONMENTAL MANAGERS. SANITARY SEWERS SHALL BE APPROVED BY THE INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT AND THE CITY OF MISHAWAKA.
3. THE CONTRACTOR OR DEVELOPER SHALL PROVIDE THE DEPARTMENT OF ENGINEERING WITH "AS BUILT" DRAWINGS OF ALL SANITARY SEWER AND SERVICES.
4. ALL NECESSARY PERMITS FOR SERVICE CONNECTIONS TO MAIN LINE SEWERS SHALL REQUIRE A PERMIT AND TAPPING FEES PER THE CITY'S REQUIREMENTS.
5. INSTALL CLEAN-OUTS AS DESIGNATED.

PREPARED BY: DLZ INDIANA, LLC



*act*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

ENGINEERING STANDARDS

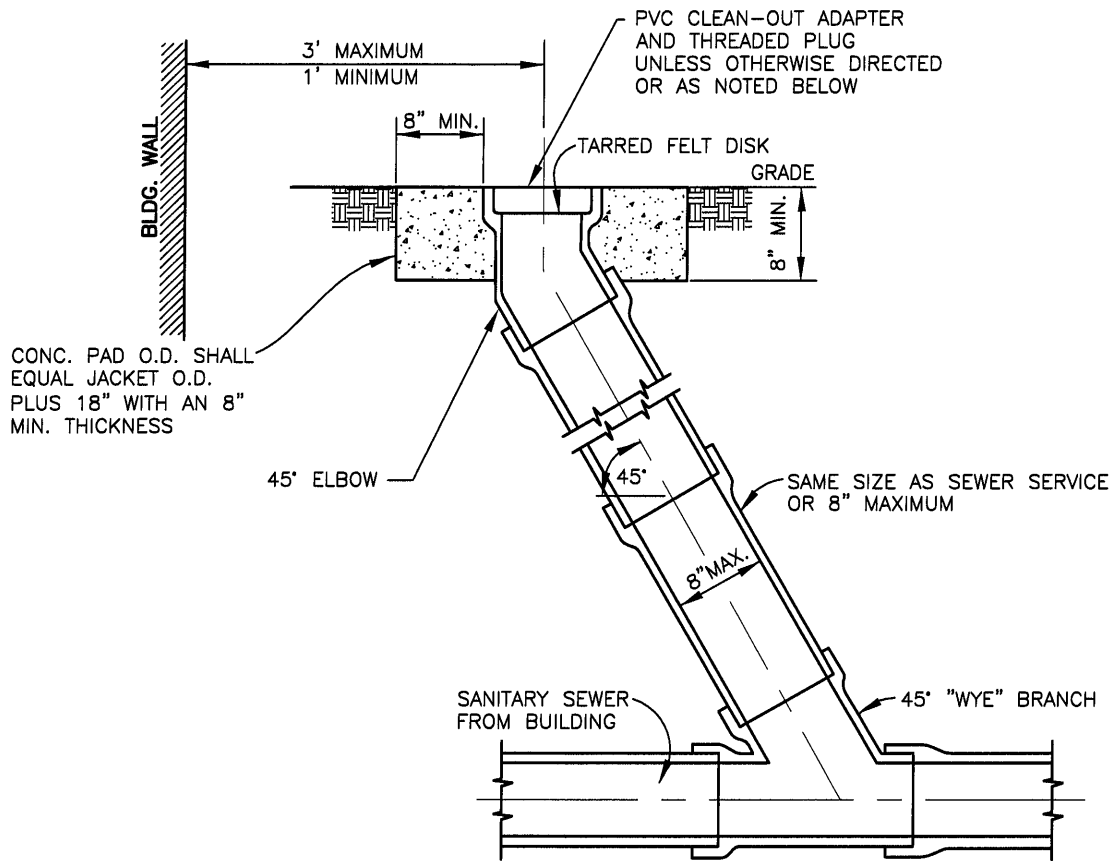
SEWER SERVICE  
RISER

SHT. NO.

V-8

ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	JAN 2008
	REVISED	MARCH 2013





TYPICAL CLEAN-OUT  
N.T.S.

**NOTES:**

1. LOCATE CLEAN-OUT SUCH THAT PLUG IS NOT LOCATED IN SIDEWALK UNLESS DIRECTED OTHERWISE.
2. IN PUBLIC RIGHT OF WAY TOP OF CLEANOUT SHALL BE CAST IRON WITH A NEENAH #R-4044 LID OR APPROVED EQUAL.
3. IN CONCRETE OR ASPHALT ROADWAYS OR SIDEWALKS, CLEANOUT AND PLUG TO BE LOCATED WITHIN A CASTING. CASTING FRAME AND LID TO BE NEENAH #R-1975 OR APPROVED EQUAL. SEE DETAIL V-9A.
4. THIS DETAIL SHALL BE FOR CLEAN-OUTS ON NEW SEWER SERVICES ACCEPTED BY THE CITY FOR MAINTENANCE.
5. ALL SANITARY SEWERS SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH THE RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES BY THE GREAT LAKES-UPPER MISSISSIPPI RIVER BOARD OF STATE AND PROVINCIAL PUBLIC HEALTH AND ENVIRONMENTAL MANAGERS. SANITARY SEWERS SHALL BE APPROVED BY THE INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT AND THE CITY OF MISHAWAKA.
6. THE CONTRACTOR OR DEVELOPER SHALL PROVIDE THE DEPARTMENT OF ENGINEERING WITH "AS BUILT" DRAWINGS OF ALL SANITARY SEWER AND SERVICES.
7. ALL NEW SERVICE CONNECTIONS TO MAIN LINE SEWERS SHALL REQUIRE A PERMIT AND TAPPING FEES PER THE CITY'S REQUIREMENTS.

PREPARED BY: DLZ INDIANA, LLC



*all*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

ENGINEERING STANDARDS

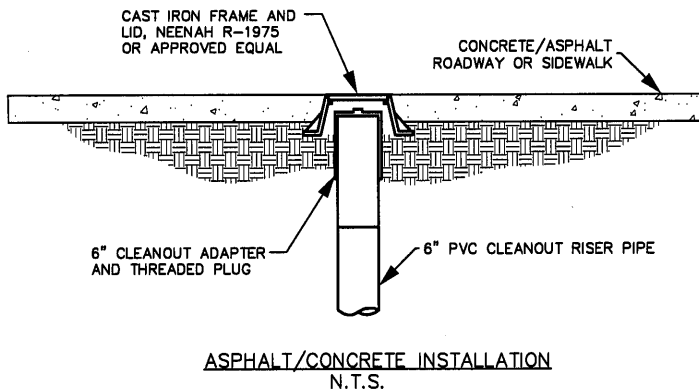
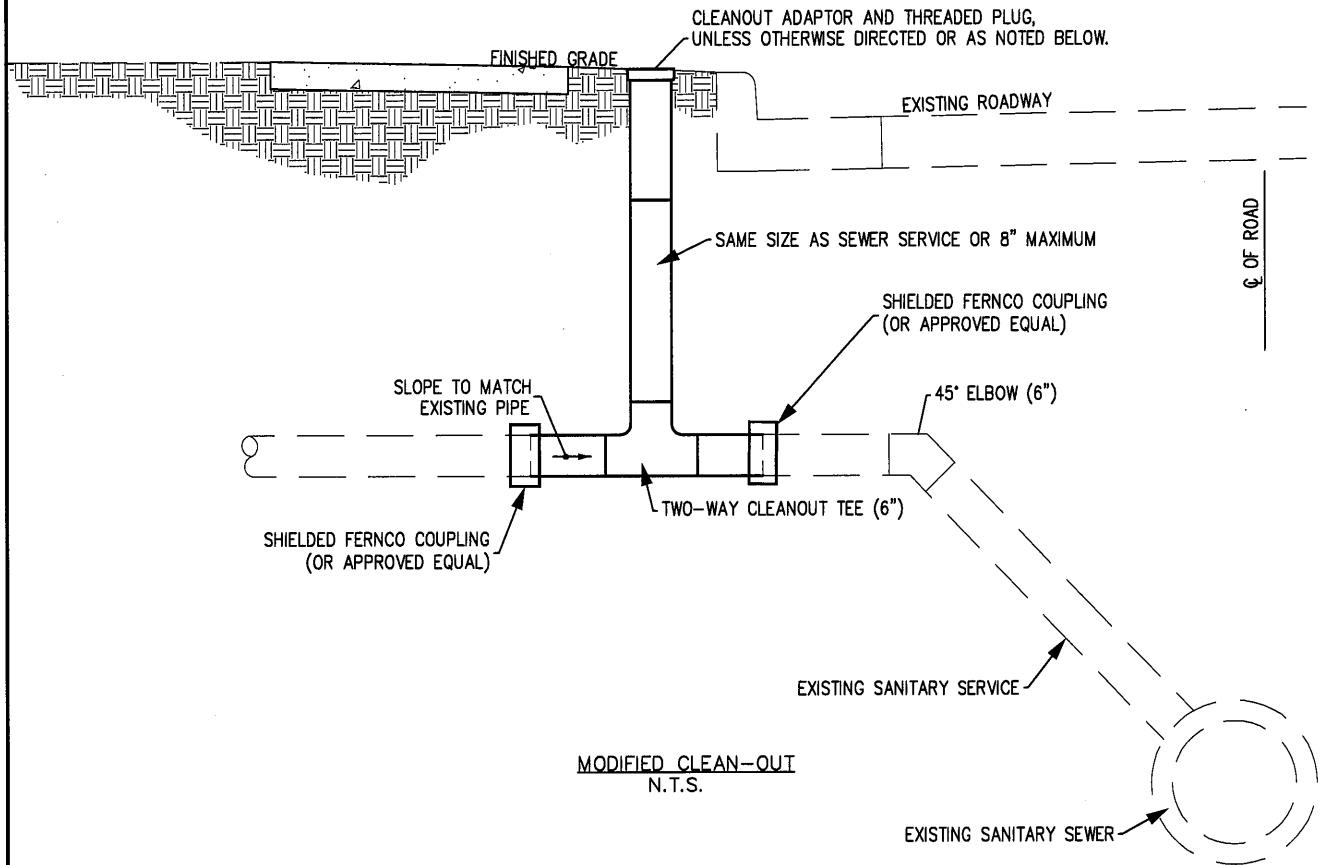
SHT. NO.

TYPICAL CLEAN-OUT

V-9

ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	JAN 2008
	REVISED	MARCH 2013

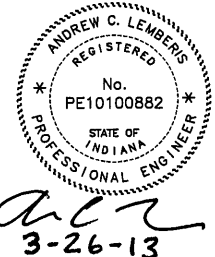




#### NOTES:

1. LOCATE CLEAN-OUT SUCH THAT PLUG IS NOT LOCATED IN SIDEWALK UNLESS DIRECTED OTHERWISE.
2. IN PUBLIC RIGHT OF WAY TOP OF CLEANOUT SHALL BE CAST IRON WITH A NEENAH #R-4044 LID OR APPROVED EQUAL.
3. IN CONCRETE OR ASPHALT ROADWAYS/DRIVEWAYS OR SIDEWALKS, CLEANOUT AND PLUG TO BE LOCATED WITHIN A CASTING. CASTING FRAME AND LID SHALL BE NEENAH #R-1975 OR APPROVED EQUAL. SEE ASPHALT/CONCRETE INSTALLATION LAYOUT, THIS PAGE.
4. THIS DETAIL SHALL BE FOR CLEAN-OUTS INSTALLED ON EXISTING SANITARY SERVICES ONLY AS APPROVED BY THE CITY.
5. CONNECTION TO THE EXISTING SANITARY SERVICE SHALL BE WITH SHIELDED FERNCO COUPLINGS OR APPROVED EQUAL.
6. THE CONTRACTOR OR DEVELOPER SHALL PROVIDE THE DEPARTMENT OF ENGINEERING WITH "AS BUILT" DRAWINGS OF ALL SANITARY SEWER AND SERVICE REPAIRS OR MODIFICATIONS.
7. ALL NEW LATERALS INSTALLED OR REPAIRS TO SERVICE LATERALS SHALL REQUIRE A PERMIT AND MAY REQUIRE TAPPING FEES.

PREPARED BY: DLZ INDIANA, LLC



APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

ITEM	REVISION	APPROVED DATE
	ADOPTED: NEW	MARCH 2013



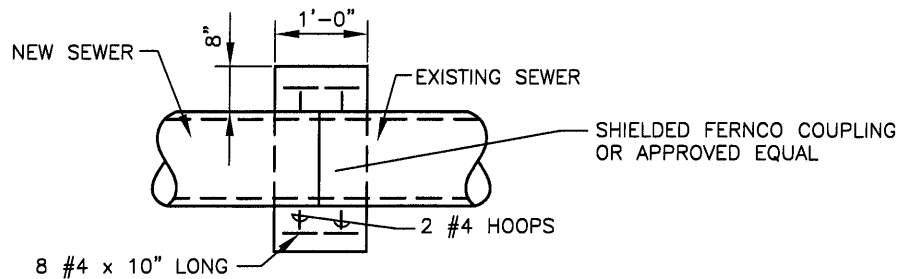
CITY OF MISHAWAKA, INDIANA

ENGINEERING STANDARDS

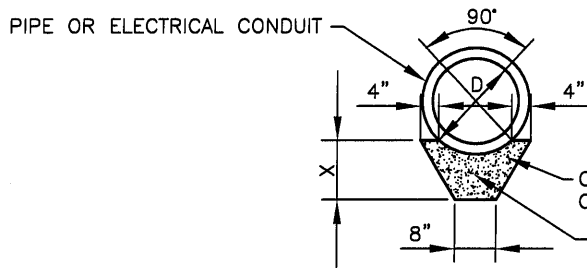
MODIFIED CLEAN-OUT

SHT. NO.

V-9A



**CONCRETE COLLAR  
FOR JOINING OLD & NEW PIPE**  
-NOT TO SCALE-

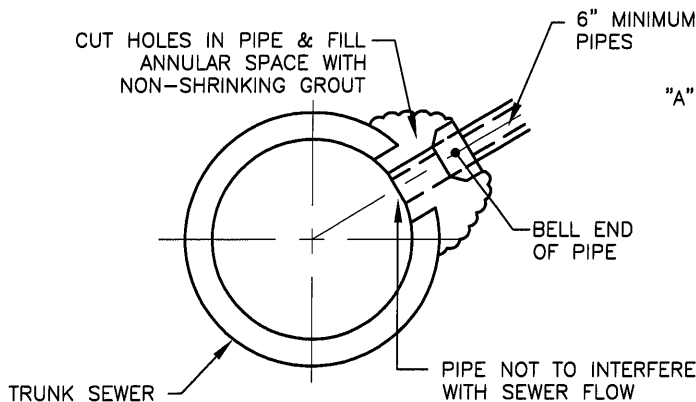


$$X = \frac{D \times L}{10}$$

X = INCHES  
D = PIPE DIA. IN INCHES  
L = LENGTH OF SUPPORT IN FEET  
MINIMUM "X" = 7

BEARING FOR SUPPORT SHALL BE A MINIMUM OF 2 FEET ON UNDISTURBED GROUND AT EACH END

**DETAIL OF PIPE SUPPORTS TO BE  
USED WHERE PIPE OR ELECTRICAL  
CONDUITS CROSS TRENCH**  
-NOT TO SCALE-



$$"A" = \frac{R}{0.7071}$$

FORMULA TO DETERMINE MAXIMUM SECTION OF PIPE THAT CAN BE CUT OUT OF TRUNK SEWER.

"A" = CUTTING DIMENSION (CHORD LENGTH)  
R = RADIUS INSIDE TRUNK SEWER IN INCHES  
0.7071 = CONSTANT

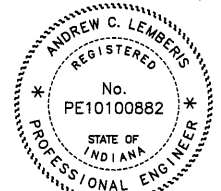
NOTE:  
IF OUTSIDE DIAMETER OF TAP PIPE IS GREATER THAN DIMENSION "A" INSTALL APPLICABLE FITTING AS APPROVED AND DIRECTED BY THE DEPARTMENT OF ENGINEERING.

**TYPICAL  
BLIND TAP**  
-NOT TO SCALE-

**NOTES:**

1. BLIND TAP ALLOWED ONLY IN SEWER MAINS LARGER THAN 12" IN DIAMETER.
2. BLIND TAPS SHALL ONLY BE INSTALLED WITH ENGINEERS APPROVAL.

PREPARED BY: DLZ INDIANA, LLC



*all*  
3-28-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	MARCH 2013



ENGINEERING STANDARDS

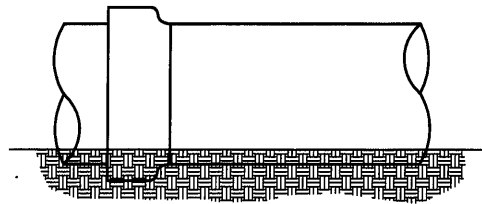
MISCELLANEOUS PIPE  
DETAILS

SHT. NO.

V-10

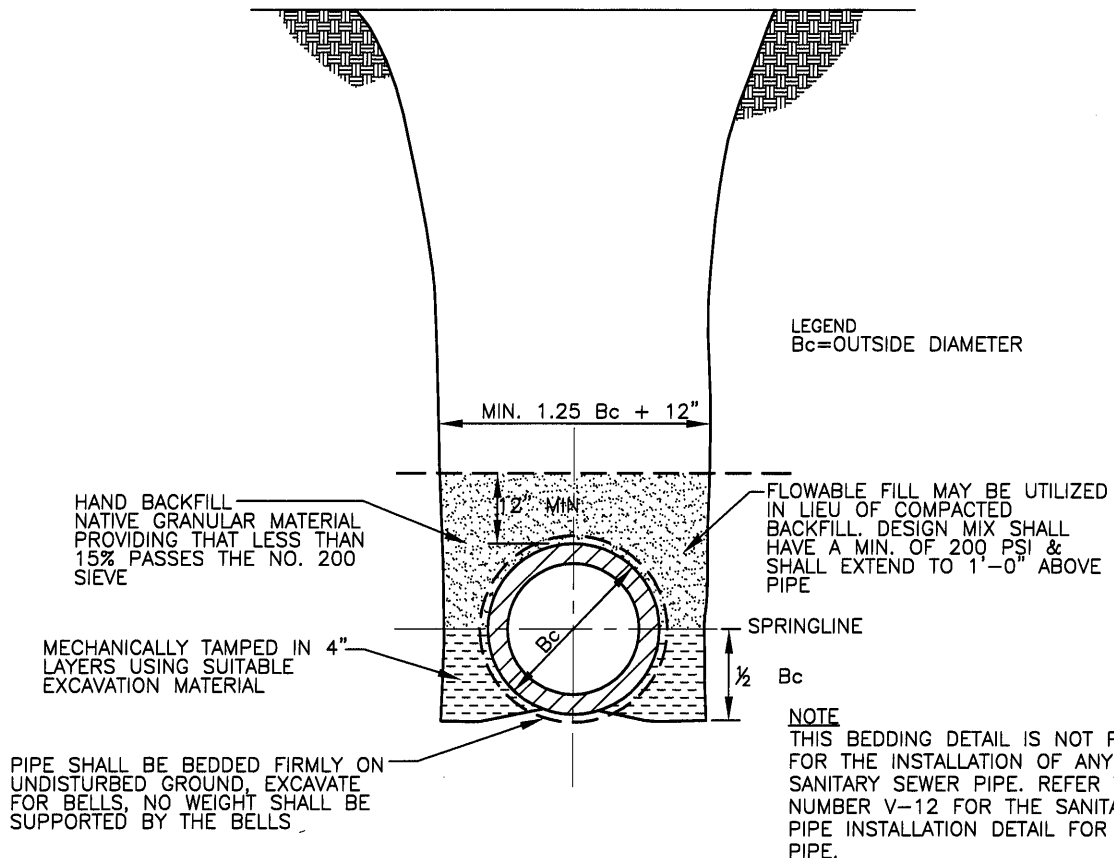


THE LOWER 90 ARC OF THE BARREL OF THE PIPE SHOULD BE IN FIRM CONTACT WITH UNDISTURBED EARTH.



SMALL EXCAVATIONS SHOULD BE MADE FOR THE BELLS. THESE SHOULD BE NO LARGER THAN NECESSARY TO CLEAR THE BELL.

NOTE: IF NATIVE MATERIAL IS GREATER THAN 15% PASSING THE NO. 200 SIEVE THEN BEDDING DETAIL 'B' WILL BE USED EXCLUSIVELY.



BACK-FILL - IN STREETS, ALLEYS, SIDEWALKS OR DRIVING AREAS:

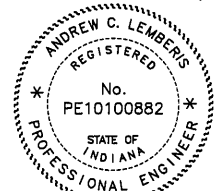
6" LAYERS, SOLIDLY TAMPED TO SUB-GRADE OF STREET BASE.

BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR

BACK-FILL - IN EASEMENT OR OPEN AREAS:

12" LAYERS SOLIDLY TAMPED.

PREPARED BY: DLZ INDIANA, LLC



*ALC*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	MARCH 2013

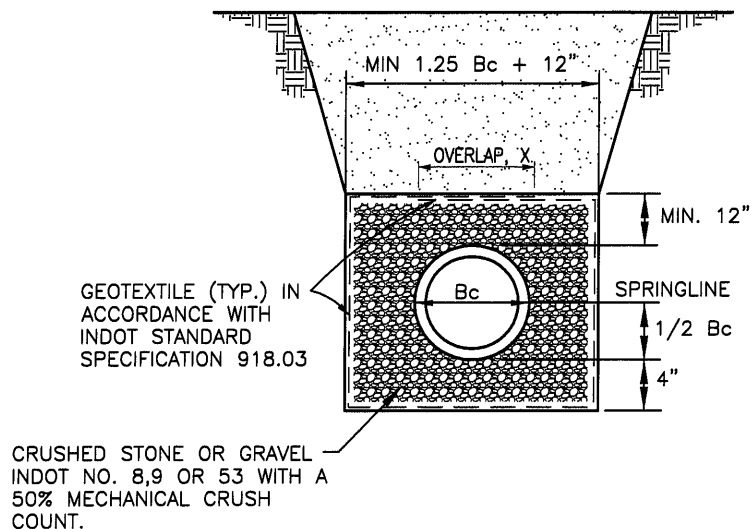


ENGINEERING STANDARDS

SANITARY SEWER  
BEDDING DETAIL "A"

SHT. NO.

V-11



GEOTEXTILE OVERLAP	
D, PIPE SIZE (IN)	X (IN)
12	12
15	15
18	18
24	24

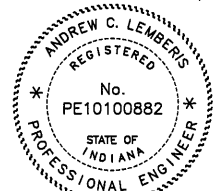
#### LEGEND

Bc=OUTSIDE DIAMETER OF PIPE

#### NOTES:

- ALL BEDDING AND INITIAL BACKFILL SHALL BE INSTALLED IN 4" TO 6" BALANCED LIFTS AND MECHANICALLY TAMPED.
- BEDDING MATERIAL SHALL BE HAND PLACED AROUND THE HAUNCH AND SIDES OF THE PIPE TO ENSURE PROPER COMPACTION AND COMPLETE FILLING OF ALL VOIDS.
- BACK-FILL - IN STREETS, ALLEYS, SIDEWALKS OR DRIVING AREAS:
  - 6" LAYERS, SOLIDLY TAMPED TO SUB-GRADE OF STREET BASE.
  - BACKFILL WILL BE GRANULAR MATERIAL WITH LESS THAN 15% PASSING THE NO. 200 SIEVE.
  - BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR
- BACK-FILL - IN EASEMENT OR OPEN AREAS:
  - 12" LAYERS SOLIDLY TAMPED.
  - FOR BACKFILL IN EASEMENTS OR OPEN AREAS NATIVE MATERIAL WILL BE ACCEPTABLE.
- THIS BEDDING DETAIL SHALL BE USED FOR THE INSTALLATION OF ALL FLEXIBLE SANITARY SEWER PIPE MATERIALS.

PREPARED BY: DLZ INDIANA, LLC



*ALZ*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	MARCH 2013

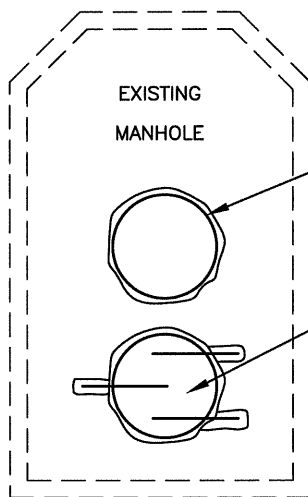


ENGINEERING STANDARDS

SANITARY SEWER  
BEDDING DETAIL "B"

SHT. NO.

V-12



EXISTING  
MANHOLE

CORE DRILL OPENING IN EXISTING MANHOLE FOR PLACEMENT OF NEW PIPE. GROUT ANNULAR SPACE FULL WITH NON-SHRINK GROUT, MASTER BUILDERS, MASTERFLOW 928, OR EQUAL.

EXISTING PIPE REMOVED. EPOXY GROUT #3 DOWELS INTO EXISTING CONCRETE, WITH MASTER BUILDERS, BRUTEM AB OR EQUAL. REPAIR HOLE WITH MASTER BUILDERS, SET 45-HOT WEATHER FORMULA, IN STRICT CONFORMANCE WITH MANUFACTURERS RECOMMENDATIONS; OR EQUAL

PREPARED BY: DLZ INDIANA, LLC



*DLZ*  
4/24/07

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY  
EFFECTIVE DATE: APRIL 2007

ITEM	REVISION	APPROVED DATE



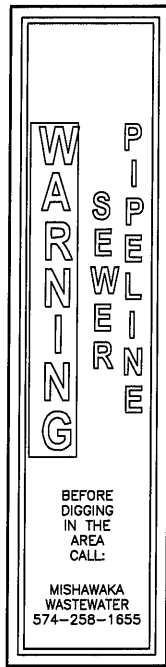
CITY OF MISHAWAKA, INDIANA

ENGINEERING STANDARDS

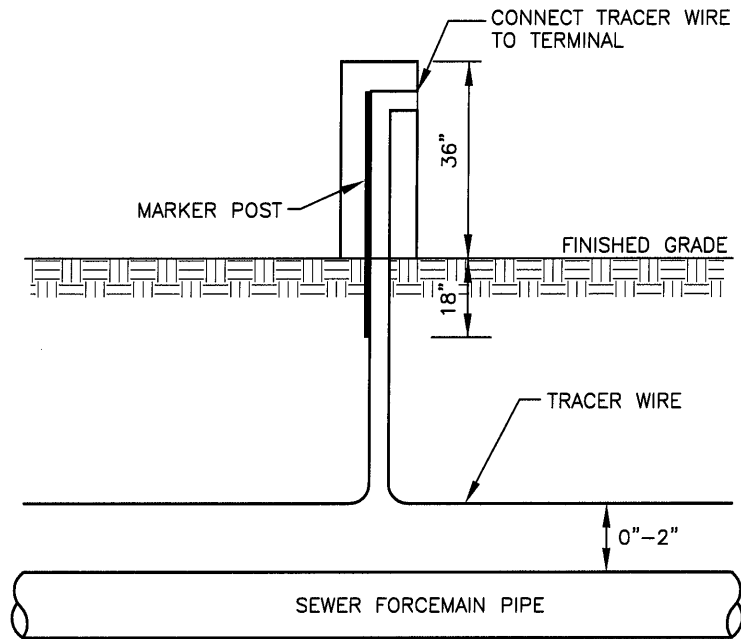
MANHOLE WALL REPAIR  
DETAIL

SHT. NO.

V-13



DECAL DETAIL  
-NOT TO SCALE-

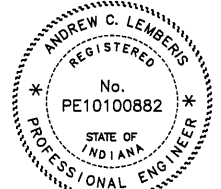


PIPE MARKER DETAIL  
-NOT TO SCALE-

**\*NOTE:**

1. ALL FORCEMAIN PIPE SHALL BE INSTALLED WITH AN ELECTRONICALLY CONTINUOUS TYPE TW INSULATED #12 TRACING WIRE.
2. MARKERS SHALL BE PLACED AT 400 FEET INTERVALS AND ALL CHANGES IN DIRECTION. MARKERS SHALL BE RHINO 2 TERMINAL TRIVIEW TEST STATIONS PRODUCT #TVTI54\_B2 OR EQUAL WITH DECALS ON EACH SIDE. THE DECALS SHALL BE GREEN WITH WHITE LETTERING AND READ: "WARNING SEWER (OR OTHER UTILITY)" AND SHALL HAVE THE PHONE NUMBER OF THE MISHAWAKA WASTEWATER DEPARTMENT: 574-258-1655. THE TRACER WIRE SHALL BE CONNECTED TO THE TERMINAL IN EACH MARKER.
3. MARKERS SHALL BE INSTALLED ON ALL SEWER FORCEMAINS AND AS OTHERWISE DIRECTED BY THE CITY.
4. FORCEMAIN TRACING WIRE SHALL MAINTAIN CONNECTIVITY THROUGHOUT THE LENGTH OF THE FORCEMAIN, INCLUDING AT ANY CHANGES IN DIRECTION, STRUCTURES, AIR RELEASE VALVES, MANHOLES, PIPE MARKERS, ETC.

PREPARED BY: DLZ INDIANA, LLC



*allz*  
3-26-13

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CITY OF MISHAWAKA, INDIANA



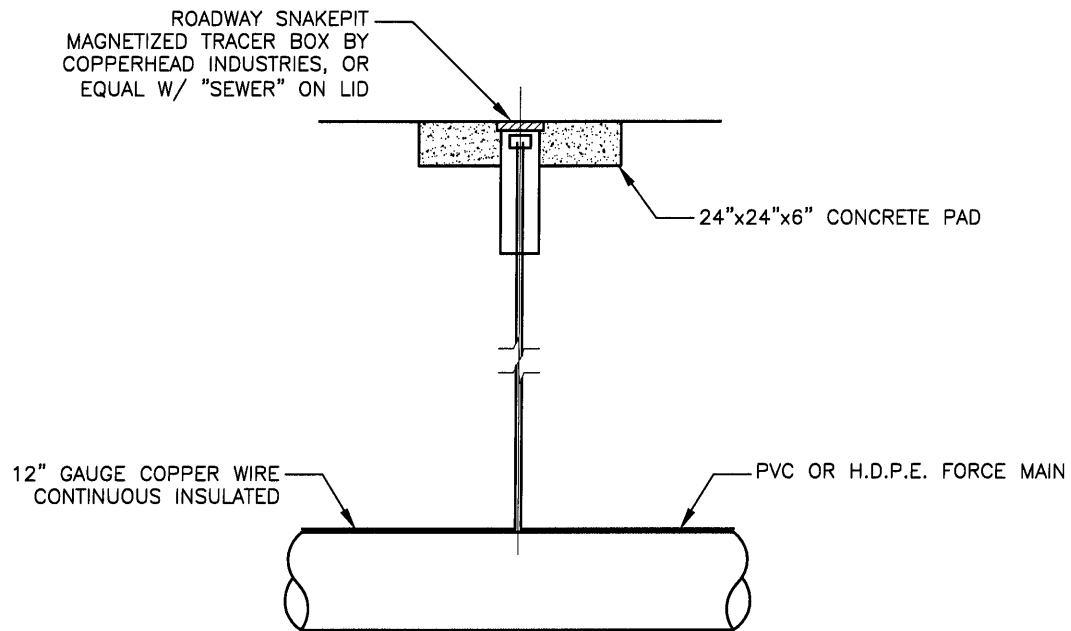
ENGINEERING STANDARDS

PIPE MARKER  
DETAIL

SHT. NO.

V-14

ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	MARCH 2013



PIPE MARKER DETAIL  
-NOT TO SCALE-

NOTES:

1. ALL FORCE MAIN PIPE SHALL BE INSTALLED WITH AN ELECTRONICALLY CONTINUOUS TYPE TW INSULATED #12 TRACING WIRE.
2. MARKERS SHALL BE PLACED AT 400 FEET INTERVALS MINIMUM AND ALL CHANGES IN DIRECTION. THE TRACER WIRE SHALL BE CONNECTED TO THE TERMINAL IN EACH MARKER.
3. FORCEMAIN TRACING WIRE SHALL MAINTAIN CONNECTIVITY THROUGHOUT THE LENGTH OF THE FORCEMAIN, INCLUDING AT ANY CHANGES IN DIRECTION, STRUCTURES, AIR RELEASE VALVES, MANHOLES, PIPE MARKERS, ETC.
4. "SEWER" CAST ON LID.
5. POURED IN PLACE CONCRETE CASE PAD, 24"x24"x6" W/PERIMETER REINFORCING.
6. WIRE TAPED AT EACH SIDE OF JOINT AND 6" O.C.
7. SINGLE CIRCUIT TRACER FOR NON-METALLIC SEGMENT.
8. REFER TO DETAIL V-14B FOR PIPE MARKER DETAIL SECTIONS.

PREPARED BY: DLZ INDIANA, LLC



*ac*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

ITEM	REVISION	APPROVED DATE
	ADOPTED: NEW	MARCH 2013

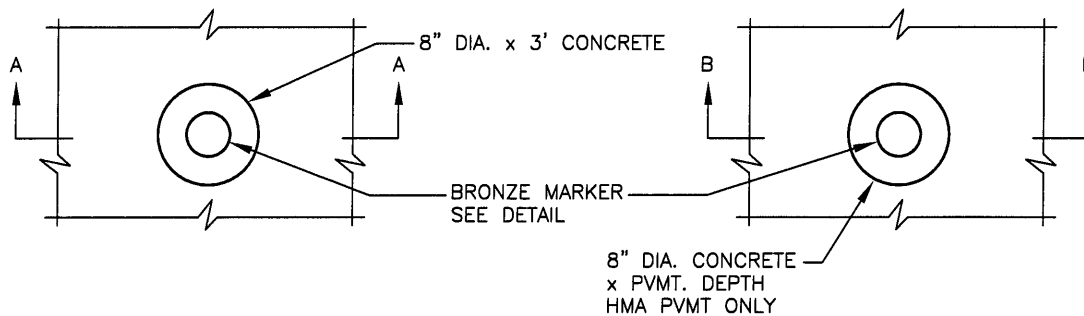


ENGINEERING STANDARDS

PIPE MARKER  
DETAIL (AT GRADE)

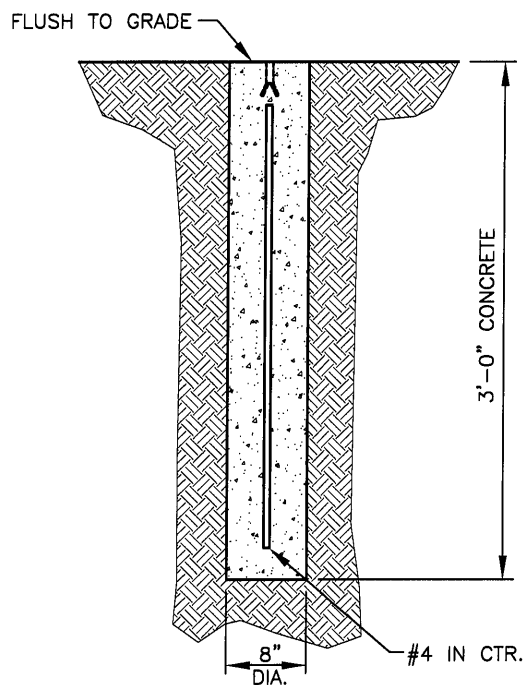
SHT. NO.  
V-14A



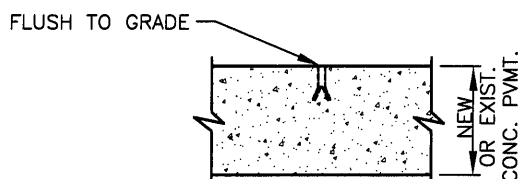


PLAN, GROUND PLACEMENT  
SCALE: N.T.S.

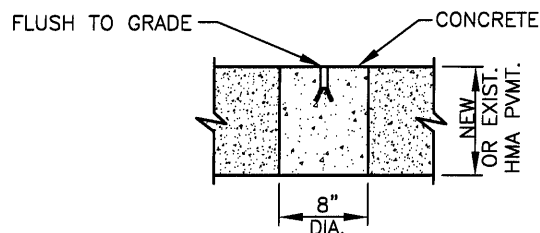
PLAN, PVMT. PLACEMENT  
SCALE: N.T.S.



SECTION A-A  
SCALE: N.T.S.



SECTION B-B CONCRETE PVMT.  
SCALE: N.T.S.



SECTION B-B HMA PVMT.  
SCALE: N.T.S.

3 1/2" DIA. BRONZE  
MARKER BY "BERNSTEN"  
CUSTOM IDENTIFICATION  
PRODUCTS OR EQUAL

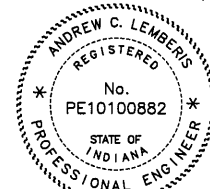


BRONZE MARKER DETAIL  
SCALE: N.T.S.

**NOTES:**

1. INSTALL @ MIN. 400' INTERVALS IN DEVELOPED AREAS.
2. INSTALL BETWEEN TRACER WIRE STATIONS.
3. REFER TO DETAIL V-14A FOR PIPE MAKER DETAIL

PREPARED BY: DLZ INDIANA, LLC



*AC*  
3-26-13

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CITY OF MISHAWAKA, INDIANA

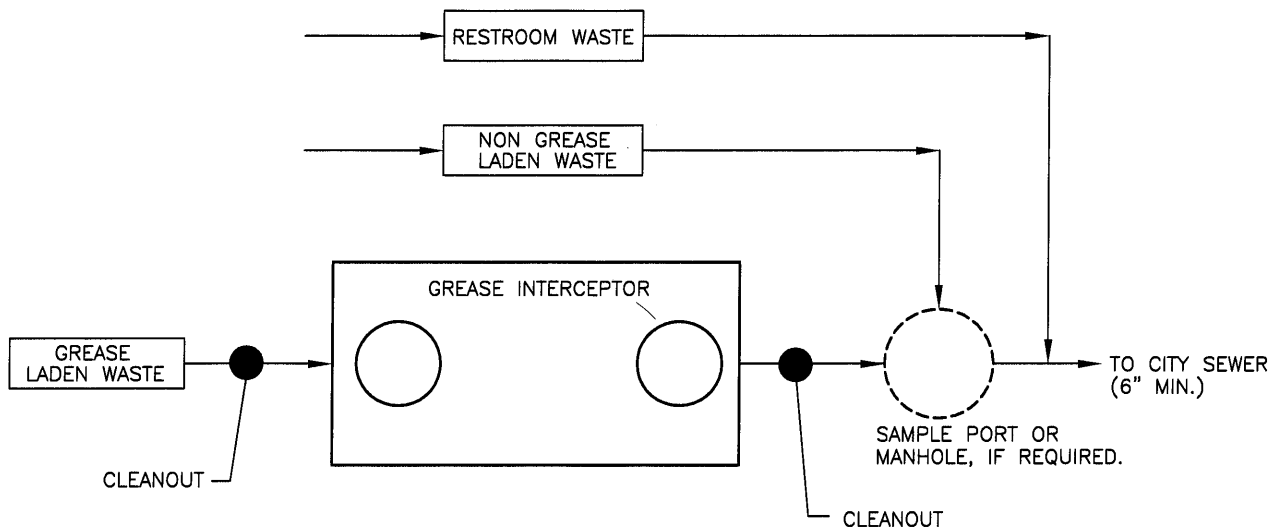
ITEM	REVISION	APPROVED DATE
	ADOPTED: NEW	MARCH 2013



ENGINEERING STANDARDS

PIPE MARKER  
DETAIL - SECTIONS

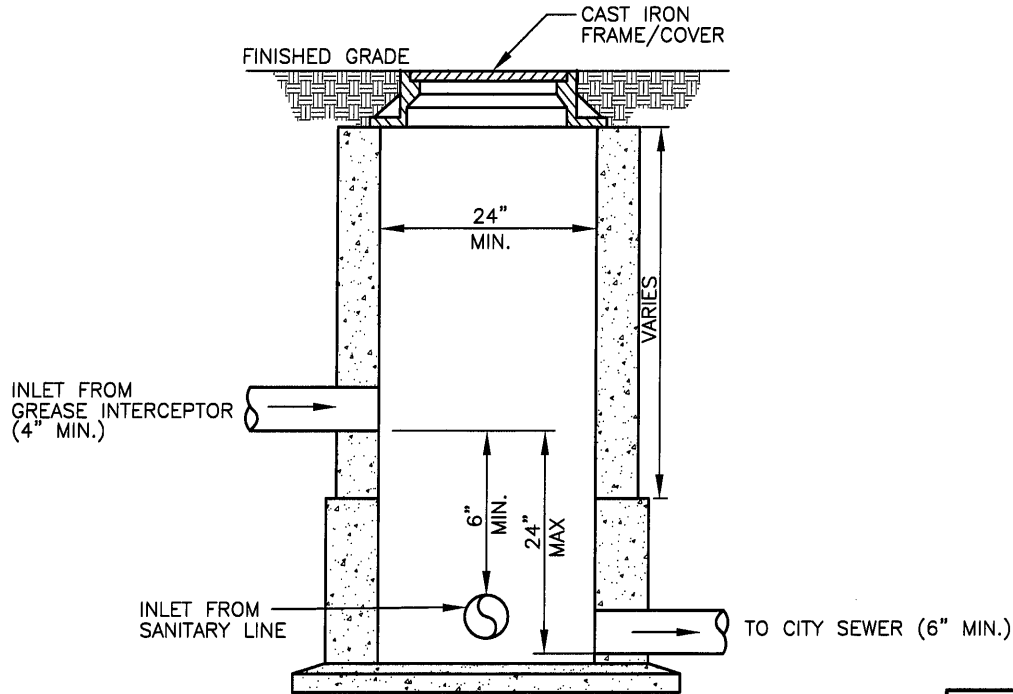
SHT. NO.  
V-14B



GREASE INTERCEPTOR AND PIPE LAYOUT

**NOTES:**

1. ALL GREASE LADEN WASTEWATER SHALL RUN THROUGH THE GREASE INTERCEPTOR.
2. NON GREASE LADEN WASTEWATER, EXCEPT RESTROOM WASTE, MAY FLOW THROUGH THE SAMPLE PORT OR MANHOLE.
3. CLEANOUTS SHALL BE INSTALLED ON EITHER SIDE OF EVERY GREASE INTERCEPTOR.
4. A SAMPLE PORT OR MANHOLE MAY BE REQUIRED UPON THE DIRECTION OF THE MISHAWAKA DEPARTMENT OF ENGINEERING.

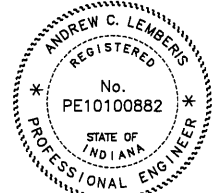


SAMPLE PORT OR MANHOLE PROFILE

**NOTES:**

1. SAMPLE PORT OR MANHOLE SHALL HAVE A MINIMUM 24" DIAMETER ACCESS COVER.
2. THE GREASE INTERCEPTOR INLET PIPE SHALL HAVE A MINIMUM 6" DROP FROM INLET PIPING TO THE OUTLET PIPING.
3. THE NON GREASE LADEN WASTEWATER LINE MUST FLOW THROUGH THE BOTTOM OF THE SAMPLE PORT OR MANHOLE.
4. THE SAMPLE PORT OR MANHOLE CANNOT HOLD WATER.
5. ANY SANITARY CONNECTION TO CITY SEWER SHALL BE A 6" MINIMUM DIAMETER.
6. SAMPLE POINTS SHALL BE ACCESSIBLE TO THE CITY OF MISHAWAKA SEWER DEPARTMENT AT ALL TIMES.

PREPARED BY: DLZ INDIANA, LLC



*all*  
3-26-13

APPROVED/REVISED BY THE BOARD OF PUBLIC WORKS & SAFETY

CITY OF MISHAWAKA, INDIANA

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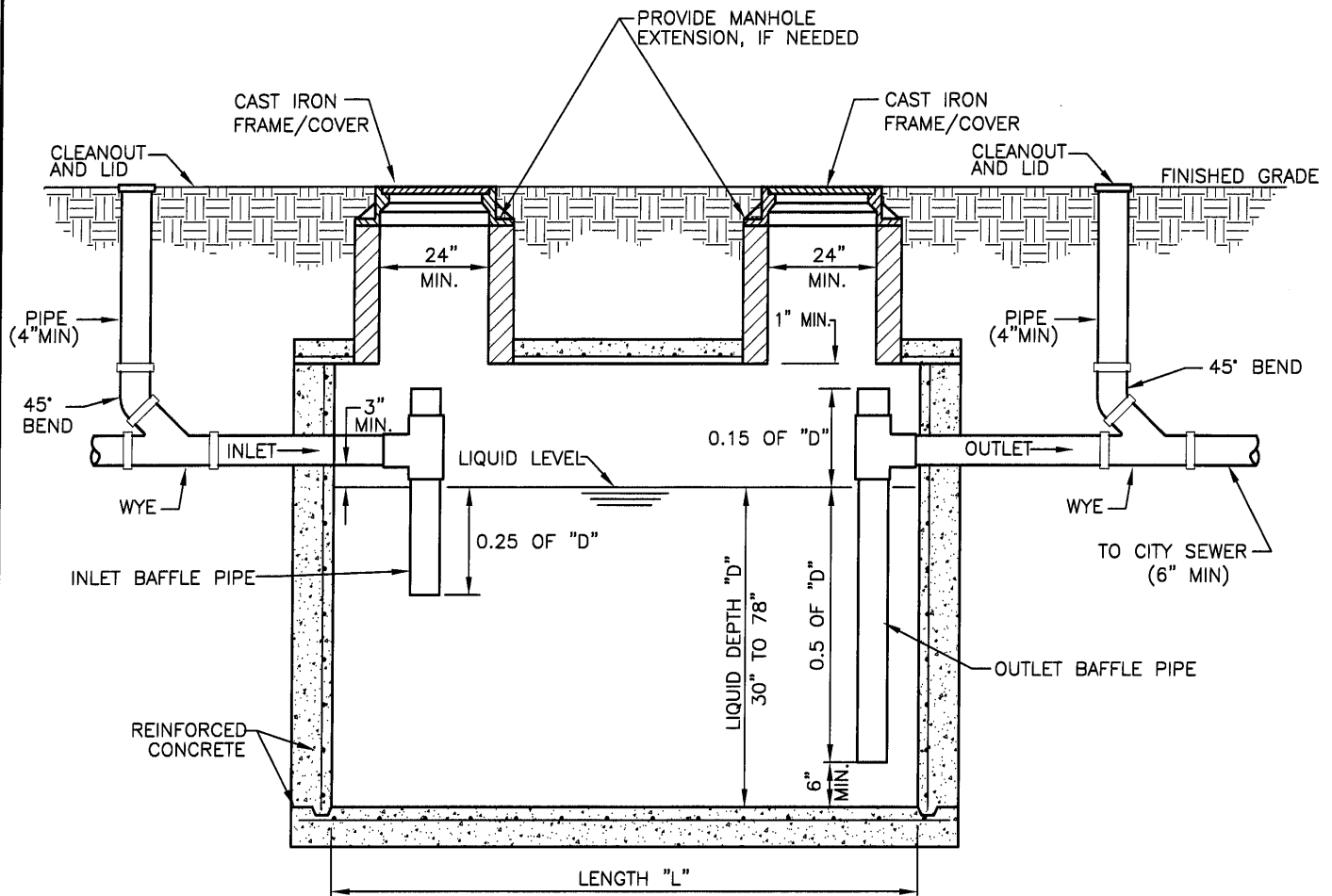


ENGINEERING STANDARDS

GREASE INTERCEPTOR &  
PIPING LAYOUT INSTALL.

SHT. NO.

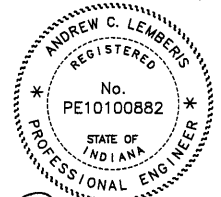
V-15



**NOTES:**

1. GREASE INTERCEPTOR SHALL BE A REINFORCED CONCRETE STRUCTURE.
2. GREASE INTERCEPTOR SHALL BE SIZED PER CALCULATIONS STATED IN SECTION V-12 OF THE SPECIFICATIONS.
3. GREASE INTERCEPTORS SHALL BE EQUIPPED WITH TWO (2) SETS OF 24" DIAMETER MANHOLE OPENINGS, ONE ON EITHER SIDE ABOVE THE BAFFLE PIPES.
4. INLET AND OUTLET PIPES SHALL BE A MINIMUM OF 4" DIAMETER.
5. TOP OF CLEAN-OUTS SHALL BE CAST IRON WITH A NEENAH #R-4044 LID OR APPROVED EQUAL.
6. IF CLEANOUTS ARE LOCATED IN TRAFFIC AREAS, CONCRETE, OR ASPHALT THE CLEANOUT AND LID SHALL BE LOCATED WITHIN A CASTING. CASTING FRAME AND LID TO BE A NEENAH R-1975 OR APPROVED EQUAL. SEE DETAIL V-9A.
7. CAST IRON MANHOLE COVER SHALL BE WATER AND GAS TIGHT.

PREPARED BY: DLZ INDIANA, LLC



*all*  
3-26-13

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CITY OF MISHAWAKA, INDIANA

ENGINEERING STANDARDS

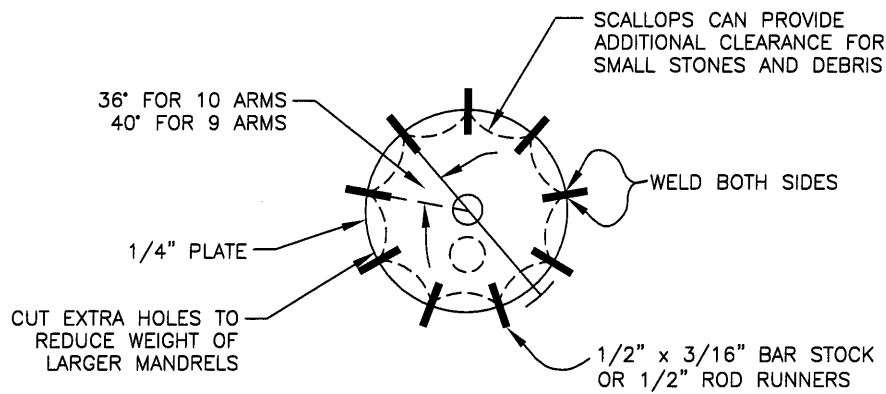
GREASE INTERCEPTOR  
DETAIL

SHT. NO.

V-16

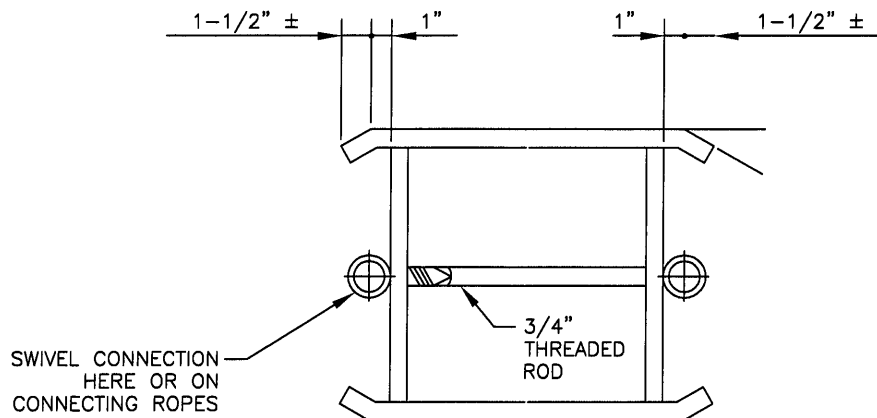
ITEM	REVISION	APPROVED DATE
	EFFECTIVE	APRIL 2007
	REVISED	MARCH 2013



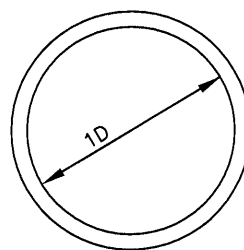


#### TRANSVERSE SECTION OF MANDREL

OTHER MANDREL FABRICATION IS PERMITTED IF INSPECTION IS OF EQUAL ACCURACY.



#### LONGITUDIAL SECTION OF MANDREL



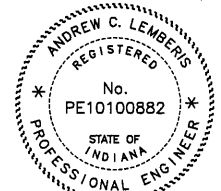
$$1D = 2R + 0.01$$

#### END VIEW OF PROVING RING

#### EXAMPLE MANDREL AND PROVING RING

(FOR PVC PIPE MEETING THE FOLLOWING: ASTM D-3034 FOR SDR35 AND SDR26;  
ASTM F-679 FOR PS46 AND PS115; AWWA C-900 AND AWWA C-905)

PREPARED BY: DLZ INDIANA, LLC



*all*  
3-26-13

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CITY OF MISHAWAKA, INDIANA

ENGINEERING STANDARDS

MANDREL AND PROVING  
RING

SHT. NO.

V-17